

The results of arthroscopic treatment for talus osteochondral lesions

Osteochondral lesions

Azad Yıldırım
Diyarlif Dağ Kapı, Diyarbakır Hospital, Diyarbakır, Turkey

Abstract

Aim: Our aim is to share the mid-term results of debridement and marrow bone stimulation process in patients with talus OCD who did not respond to the conservative treatment. **Material and Method:** The patients with talus osteochondritis dissecans were treated by arthroscopic debridement; and bone marrow stimulation was performed with K-wire. Twenty-six of them formed the primary and 15 of them formed the revision group. Clinical assessment included the Ogilvie-Harris score and American Orthopaedic Foot & Ankle Society (AOFAS) ankle-hindfoot score. The defects were classified according to the system of Berndt and Harty. The lesion side, symptom time, trauma history, age-related complication, Ogilvie-Harris and AOFAS scores, follow-up period, and well-being condition of the groups were compared. **Results:** A total of 41 patients, 25 males and 16 females, with a mean age of 34.3 years (range 19-62), were included in the present study. Follow-up ranged from 23-73 month (mean 34,3). The individual analysis results showed that the pre-operative AOFAS scores were significantly different between the primary and the revision groups, while post-operative scores were not significantly different between the primary and the revision groups. For the whole group, the AOFAS score was excellent in 9 patients, good in 25, fair in 6 and poor in one. In the primary group the AOFAS scores were good in 14 (54%), fair in four (15) and excellent in eight (31) patients, while in the revision group they were good in eleven (73%), fair in two (13%) and poor in one (7%) patient. The combined good and excellent scores were 85% for the primary group and 80% for the revision group. The mean AOFAS AHS score at the 12th month was 88.2 in the primary group and 82.8 in the revision group. **Discussion:** Arthroscopic curettage and bone marrow stimulating process is a viable method and recommended for both primary and revision treatment of an osteochondritis dissecans of the talus.

Keywords

Osteochondritis Dissecans; Bone Marrow; Talus.

DOI: 10.4328/JCAM.5919 Received: 04.06.2018 Accepted: 08.10.2018 Published Online: 09.10.2018 Printed: 01.05.2019 J Clin Anal Med 2019;10(3): 359-64
Corresponding Author: Azad Yıldırım Diyarlife Dağ Kapı, Diyarbakır Hospital, Diyarbakır, Turkey.
E-Mail: yildirimazad@gmail.com
ORCID ID: 0000-0001-7058-4476

Introduction

Symptomatic ankle cartilage defects often require surgery. The osteochondritis dissecans (OCD) is various and often occurs as a result of simple or more complex traumatic events and in this condition, there is a partial or complete separated fragment. It was first described by König in 1888 and later by Berndt and Hardy in 1959. Talus OCD typically has complaints such as a trauma story, stubborn ankle pain, edema, stiffness, and reduced ROM. While OCD may cause lateral foot instability in inversion injuries, there may be local tenderness around the ankle joint. Most lesions can be diagnosed by direct radiography, however, in some lesions diagnosis can only be made with Magnetic resonance imaging (MRI). While especially in Type 1 and Type 2 lesions, casting, nonsteroidal antiinflammatory drugs, reduction of load bearing and conservative treatments consisting of rehabilitation are recommended, there are also some studies suggesting that conservative treatment gives worse results than surgery [3]. Transferring autologous osteochondral graft from the ipsilateral side into the talar dome defect [4] and open mosaicplasty has been studied as an effective treatment modality in lesions larger than 1.5 cm in diameter with subchondral cyst formation [5]. Autologous chondrocyte implantation is also an option currently available [6,7]. But all these techniques are expensive and need a long hospital stay. However, the use of debridement and bone marrow stimulation in patients with talus osteochondritis dissecans who did not respond to the conservative treatment, provides cheap and short hospital stay and special pain relief effects. In addition, this process quite shortens patient's time of returning to the daily life and has a little complication if carried out by skilled hands.

Material and Method

Forty-one patient admitted to our clinic due to talus OCD between 2006 and 2012 were included in our study by taking their signed consent forms. There were 25 men and 16 women. Generalized osteoarthritis, inflammatory joint disease, gout, neuroarthropathy, and ankle instability were excluded from the study. Patients with a trauma history who had previously undergone surgical treatment and patients with OCD over 4 cm were also included in the study. Twenty-six of them formed the primary and 15 of them formed the revision group. Thirteen patients in the revision group had undergone microfracture and drilisation by the open method in other centers and 2 patients had undergone open mosaicplasty. Patients who did not respond to conservative treatment had pain for at least 2 months. It was almost impossible to participate in a sport activity for our patients who took up sport. Some of our patients needed to take a break during the walk. In the majority of our patients, pain and limitation of movement were unilateral. These patients had a profound and localized pain especially decreasing at rest but increasing with loading. Patients' anamneses were taken and examinations were performed. All movements and especially dorsal plantar flexions were examined. Although some patients were diagnosed with direct radiographs (Figure 1), some patients were only diagnosed with MRI (Figures 2,3,4,5) and CT. However, CT and MRI results of all the patients were preoperatively obtained. Patients who previously were not treated medically were immobilized with plaster splint/orthosis for at



Figure 1. Plain AP radiograph of talus medial OCD.



Figure 2. MRI Images of medial OCD.

least 2 months together with medication. Before and after the operation, there was no difference in terms of ROM between the foot with ocd and the normal foot, but there was only a minimal limitation due to the increased pain towards the end of



Figure 3. MRI Image of lateral talus OCD.



Figure 4. MRI Image of lateral talus OCD.



Figure 5. MRI Image of lateral talus OCD.

the motion. However, patients who had been treated at other centers but their complaints did not get better were prepared for surgery without being given conservative treatment. In 25 patients whose complete sets of radiographs were available,

the defects were classified according to the system of Berndt and Harty [2]. Lesion side, symptom time, trauma history, age, and follow-up period of both groups were also compared. The results were evaluated according to the Ogilvie-Harris scoring including pain, edema, limping, stiffness, and activity [8]. The outcomes of surgery were assessed using the Ankle-Hindfoot Scale (AHS) from the AOFAS (preoperatively and at 6 and 12 months postoperatively). The AHS score was stratified as follows: excellent from 90 to 100; good from 80 to 89; fair from 60 to 79; and poor <60 [6]. Patients were operated by a single orthopedic surgeon under GAA or spinal anesthesia, in supine position and with the tourniquet when the knee joint was at least at 90 degrees flexion angle and after the risks were minimized. The process was started first by opening the anteromedial portal, then an anterolateral portal was made under arthroscopic control by using a 4 mm, 30° angle arthroscope. None of the patients needed any additional portal. Arthroscopic joint examination was performed first (Figure 6). The lesion was then shaved with shavers and punches and thoroughly cleaned (Figure 7). Partial synovectomy was performed if necessary. Microfracture and drilling were performed on the defect area with K-wires perpendicular to the talus which would be at 3-4 mm distances. After the procedure was completed, the joint was thoroughly irrigated and after the mini hemovac drain was placed and the wound was sutured, the operation finished. The mean duration of the operation was 35 min. Patients were discharged from the hospital within an average of 1-3 days, after removing hemovac drain. Cefazolin Sodium was used for only 1 day for prophylaxis. During the first week, while absolute elevation and cold application were performed, the extremities were kept in plaster for 2 weeks. Sutures were taken on the 15th day. The patients were immobilized for 6 weeks. During this

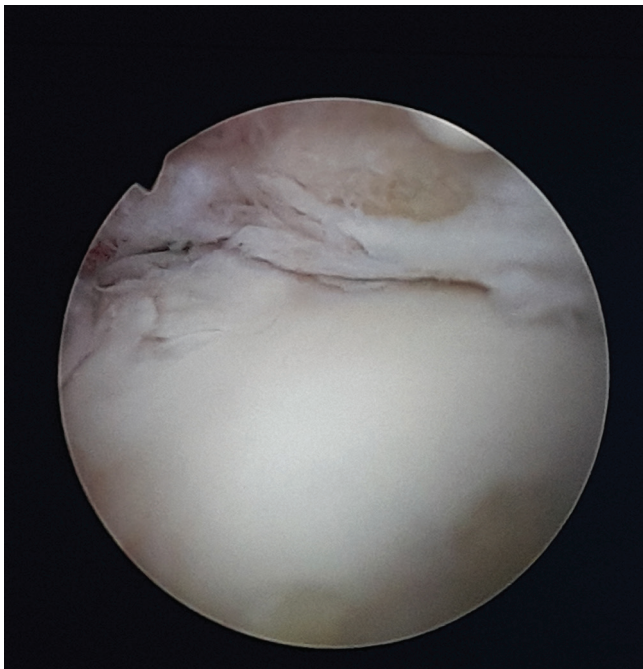


Figure 6. Arthroscopic appearance of talus OCD.

term, active and passive exercises were given to achieve mobility, control of edema, stretching, and proprioceptive training. From the sixth week onwards, the load was increased gradually.

Statistical Analyses

Statistical analyses were performed by using IBM SPSS (version 23) and R language. A one-way multivariate analysis of variance (MANOVA) was used to test the hypothesis that there would be mean differences between previous surgery states (Primary and Revision) and AOFAS scores. In order to examine individual effects of the previous surgery state, Fisher's Least Significant Difference (LSD) pairwise comparisons were performed. In order to analyze multilevel Ogilvie-Harris scores in stratified and unbalanced contingency tables, generalized Cochran-Mantel-Haenszel (CMH) statistics were used.

Results

A total of 41 patients, 25 males (61%) and 16 females (39%), with a mean age of 34.3 years (range 19-62), were included in the present study. The interval mean was 25.4 (range 8-42) and mean follow-up 34,3 (range 23-73 m) months. The preoperative and postoperative clinical data of the patients are summarized in Table 1 and Table 2. Of these, 26 had not previously undergone surgery (Table 1) and 15 of them were included in the revision group who had undergone surgery (Table 2). In 37 of our patients, OCD was <2 cm, in 3 of them it was 2-4 cm, and it was >4 cm in one patient. The lesion was in the medial side of Talus in 28 patients and lateral in 13. The mean follow up time was 41.2 months (range 24-73 m). Patients' expectations were classified as excellent, good, moderate, and poor. There were no complications such as iatrogenic chondral injury, neurovascular injury, and compartment syndrome in our patients. The AHS scoring was based on 100 points. The components of the AHS are pain, ankle function, and foot alignment respectively. For the whole group, the AOFAS score was excellent in 9 patients, good in 25, fair in 6 and poor in one patient. In the primary group, the AOFAS scores were good in 14 (54%), fair in

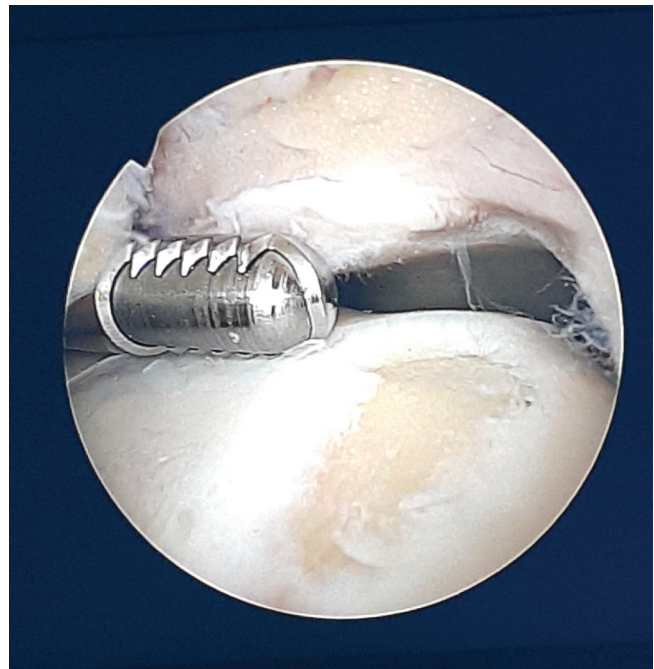


Figure 7. OCD lesion cleaned with shaver.

four (15 %) and excellent in eight (31%) patients, while in the revision group scores were good in eleven (73%), fair in two (13%) and poor in one (7%) patient. The combined good and excellent scores were 85% for the primary group and 80% for the revision group. The mean AOFAS AHS score at the 12th month was 88.2 in the primary group and 82.8 in the revision group. Except for two patients in the primer group and three patients in the revision group all the patients were able to return to their previous work activities after the operation. The osteoarthritis classification at the time of follow-up was grade 0 on thirteen radiographs (31%), grade I on thirty (63%), grade II on two (5%), and grade III on zero.

Average values of AOFAS scores per previous surgery state and 95% confidence intervals for mean estimates are given in Table 3. According to MANOVA result, there was statistically significant difference in pre-operative and post-operative AOFAS scores based on the previous surgery state. The individual analysis results showed that the pre-operative AOFAS scores were significantly different between primary and revision groups while post-operative scores were not significantly different between primary and revision groups. Test results (Cochran-Mantel-Haenszel-CMH) revealed that the association between operation state (pre- and post-operative) and Ogilvie-Harris scores adjusting for primary and revision groups were statistically significant, except for Limping.

Discussion

The good and excellent working rates in our retrospective study, with an average 3-year follow-up, shows similarities with the literature rates. Despite the fact that there was no significant change in the majority of our patients radiologically (no osteophytes and degenerative changes), the increase in quality of life, especially with the decrease of the symptoms, is quite rewarding. While Ferkel et al. didn't observe any arthritic changes in 66% of the patients in their studies, they reported a progression to grade 1 in 30%, grade 2 in 2% and grade 3 in 2% [11]. However, Christiaan J.A. van Bergen et al. reported grade 0 on

sixteen radiographs (33%), grade I on thirty (63%), grade II on two (4%), and grade III on zero [12]. But in our study, there were osteoarthritic changes in grade I level in % x, and in grade 2 level in % y and only 5 patients had osteophytic changes. However, we think that the radiographic changes are not related to the clinical status of the patients. Canale and Belding studied fifteen defects treated with open excision and curettage [13] after a mean follow-up of eleven years. Eleven (73%) of the patients had good clinical results and approximately 50% had degeneration of the joint. Angermann and Jensen reported on eighteen patients who had undergone open excision and drilling [14]. After a mean follow-up of twelve years, almost all patients had persistent symptoms and 17% had osteoarthritis. Although it is not expected to make a proper comparison between this study and open methods due to the differences in patient characteristics in different studies, it can be seen that arthroscopic method is more successful if we look at the mid-term results of our study.

Bone marrow stimulation (BMS) is also an important component for the success and it can be accomplished by several different surgical methods [15]. Drilling was used in the 1990s, but microfracture has gained popularity since 2000 [16]. According to Christiaan J.A, van Bergen et. al., drilling can cause bone necrosis with heat effect, but the cooling effect of the used fluid prevents it. Again, according to them, the microfracture awl is more likely to reach the lesion wall due to its curve of 45 degree. Despite the fact that free bone particles can occur with microfracture, in fact, microfracture stimulate the response to recovery rather than destruction in the trabeculae [16, 17]. Pluripotential stem cells are recruited from the bone marrow, and the formation of fibrocartilaginous tissue is initiated [18]. The main purpose here is to clear all unstable cartilage and necrotic tissues in and around the lesions and stimulate cartilage production. On the other hand, we must pay attention to the junction of the normal cartilage and the defect region and make a sufficient number of holes. We believe that it would be more useful not to allow a sharp transition to the normal cartilage in this damaged region, rather, make this transition in a shoulder shape way. In our study, we used only a 2.0 mm K-wire for all our patients. The number of osseous particles formed from the tunnels opened during the BMS made with K-wire is very few. In addition, because K-wire is more flexible than other materials, it is more likely to reach the entire lesion region and work at the angle we need. It's also an instrument which has a very little heater and necrosis effect and is cheap, easy to reach and much less likely to break. Moreover, it is less likely to have complications such as iatrogenic cartilage injuries and stress fractures which can then cause undesirable situations like edema, swelling and pain. According to some authorities, there is a strong correlation between lesion size and success ratio. For lesions smaller than 15 mm, regardless of location, excellent results were obtained [19]. Coherent with the literature, we think that it is easier to obtain good and very good results especially when the diameter of the lesion is lower than 2 cm regardless of the lesion side. However, even if the diameter is more than 2 cm, this process is very useful. We also believe that rehabilitation programs, which will be gradually introduced after at least 3-4 weeks immobilisation, plays a unique role in consolidating the success.

Conclusions

Arthroscopic curettage and bone marrow stimulating with K-wire is a viable method and recommended for both primary and revision treatment of an osteochondritis dissecans of the talus.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

Funding: None

Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

References

- König F. Ueber freie Körper in den Gelenken. Deutsche Zeitschr Chir. 1888; 27: 90-109.
- Berndt AL, Harty M. Transcondral fractures (osteochondritis dissecans) of the talus. J Bone Joint Surgery Am. 1959; 41: 988-1020.
- Tol JL, Struijs PA, Bossuyt PM, Verhagen RA, Van Dijk CN. Treatment strategies in osteochondral defects of the talar dome: a systematic review. Foot Ankle Int. 2000; 21(2): 119-126.
- Steadman JR, Briggs KK, Rodrigo JJ, Kocher MS, Gill JJ, Rodkey WG. Outcomes of microfracture for traumatic chondral defects of the knee: average 11- year follow-up. Arthroscopy. 2003; 19(5): 477-84.
- Emre TY, Ege T, Çift HT, Demircioğlu DT, Seyhan B, Uzun M. Open mosaicoplasty in osteochondral lesions of the talus: a prospective study. Foot Ankle Surg. 2012; 51: 556-60.
- Giannini S, Battaglia M, Buda R, Cavallo M, Ruffilli A, Vannini F. Surgical treatment of osteochondral lesions of the talus by open -field autologous chondrocyte implantation: a 10 year follow up clinical and magnetic resonance imaging T2 mapping evaluation. Am Sports Med. 2009; 37 (Suppl. 1) ; S112-18.
- Schneider TE, Karaikudi S. Matrix-induced autologous chondrocyte implantation(MACI) grafting for osteochondral lesions of the talus. Foot Ankle Int. 2009; 30(9): 810-14.
- Ogilvie-Harris DJ, Mahomed N, Demaziere A. Anterior impingement of the ankle treated by arthroscopic removal of bony spurs. J Bone Joint Surg (Br) 1993; 75(3): 437-40.
- Kitaoka HB, Patzer GL. Analysis of clinical grading scales for the foot and ankle. Foot Ankle Int. 1997; 18(7): 443-6.
- Ibrahim T, Beiri A, Azzabi M, Best Aj, Taylor GJ, Menon DK. Reliability and validity of the subjective component of the American Orthopaedic Foot and Ankle Society clinical rating scales. J Foot Ankle Surg. 2007; 46(2): 65-74.
- Ferkel RD, Zanotti RM, Komenda GA, Sgaglione NA, Cheng MS, Applegate GR, et al. Arthroscopic treatment of chronic osteochondral lesions of the talus: long-term results. Am J Sports Med. 2008; 36(9): 1750-62.
- Van Bergen CJ, Kox LS, Maas M, Sierevelt IN, Kerkhoffs GM, Van Dijk CN. Arthroscopic treatment of osteochondral defects of the talus: outcomes at eight to twenty years of follow-up. J Bone Joint Surgery Am. 2013; 95(6): 519-25.
- Canale ST, Belding RH. Osteochondral lesions of the talus. J Bone Joint Surg Am. 1980; 62(1): 97-102.
- Angermann P, Jensen P. Osteochondritis dissecans of the talus: long-term results of surgical treatment. Foot Ankle. 1989;10(3): 161-3.
- Zengerink M, Struijs PA, Tol JL, van Dijk CN. Treatment of osteochondral lesions of the talus: a systematic review. Knee Surg SportsTraumatol Arthrosc. 2010; 18(2): 238-46.
- Steadman JR, Rodkey WG, Rodrigo JJ. Microfracture: surgical technique and rehabilitation to treat chondral defects. Clin Orthop Relat Res. 2001; Suppl. 391):

S362-9.

17. Van Bergen CJ, de Leeuw PA, van Dijk CN. Potential pitfall in the microfracturing technique during the arthroscopic treatment of an osteochondral lesion. *Knee Surg Sports Traumatol Arthrosc.* 2009; 17(2): 184-87.

18. Steadman JR, Rodkey WG, Rodrigo JJ. Microfracture: surgical technique and rehabilitation to treat chondral defects. *Clin Orthop Relat Res.* 2001; (Suppl. 391): 362-9

19. Chuckpaiwong B, Berkson EM, Theodore GH. Microfracture for osteochondral lesions of the ankle: outcome analysis and outcome predictors of 105 cases. *Arthroscopy* 2008; 24(1): 106-12.

How to cite this article:

Yıldırım A. The results of arthroscopic treatment for talus osteochondral lesions. J Clin Anal Med 2019;10(3): 359-64.